

# CLARK ECOROOF FINAL REPORT

---

## Project Summary

<b>Project Type</b>	<b>Residential Ecoroof Over Patio Area</b>
<b>Roof Type</b>	Extensive
<b>Soil Depth</b>	4"
<b>Ecoroof Coverage</b>	114 sq. ft.
<b>Ecoroof Cost</b>	\$997.77
<b>Total Structure Cost</b>	\$2597.15
<b>Zoning Variance and Recording Cost</b>	\$406.00
<b>Construction Period</b>	August 2010-December 2010

**Submitted By:** Rebecca Clark

**Project Address:** 5035 North Depauw Street, Portland, OR 97203

### Project Description

As a Landscape Designer I have become very interested in storm water management and how to incorporate good management of water into designs. I have taken classes on ecoroofs, rain gardens, and water catchment, but I felt the best way to gain experience in these subjects was to build and manage projects on my own property.

This structure is to cover a patio area in the back corner of the lot. The structure measures 9 ½' by 12' and has an 11 degree slope. The roof slopes down toward the South/Southwest. There is a large English Walnut tree located at the back corner of the roof that partially shades it. For this reason, plants that are able to tolerate shade were chosen for the roof.

### Pre-Construction

My first priority was to start with a structurally sound design. Most of the projects I had viewed on line were of ecoroofs that were either supported by solid walls or were open-sided, but attached to an existing structure. Since I planned on building an open structure with no walls, I was concerned about its stability. I took a drawing of my proposed project to Pat Lando and Associates who had BKE Inc. Structural Engineers draw up details of all parts of the construction and perform the structural calculations necessary.

My next step was determining whether it would be possible to build nearly on my property line and still follow city code. The structure was small enough that I did not need a building permit. I was advised that I would need a zoning variance to build inside the set-back area of my property. This required submitting information on how I was planning to meet the adjustment approval criteria, such as, how the project would not detract from the livability or appearance of the area. After I submitted my proposal, the City sent a notice of the proposal to every residence in my neighborhood. My neighbors were given 28 days to object to the proposal if they so desired. The proposal was approved.

## **Construction**

Construction was begun in August of 2010. All construction was done by the homeowners. Treated 4 x 6's were used to support the roof. The 4 x 6's each have 8 lag screws partially embedded with a support cage of 4 vertical pieces of rebar all tied around the 4 x 6's and embedded in concrete. The supporting structure is of 2 x 10's 18" on center. EPDM pond liner was used as the waterproof membrane over ¾" plywood. 4 x 6's were used as the curb to hold the planting medium. Custom-made aluminum flashing was used to cap the curb. No drainage layer or other material was placed between the EPDM and the planting medium. Burlap was laid over the planting medium to prevent wind erosion. A 3" strip of gravel was installed at the lower end of the roof to aid drainage. The planting medium was separated from the gravel strip by an aluminum edge board. A drain pipe sock was placed between the edge board and the planting medium to decrease leaching of the medium into the gravel. Galvanized metal normally used for venting was installed as the scupper and drain pipe. A shower drain cover was used to restrain the gravel from entering the scupper.

Planting was finished on Christmas day with a variety of sedums and other drought-tolerant plants. All the plants appear to have survived the freezing weather they experienced just after planting.

## **Unexpected or Unavoidable Issues**

The pre-construction phase was longer than expected due to the length of time locating an engineer that the home owners could afford, and the length of time taken to gain approval of the zoning variance.

Other issues were typical of home projects. Digging 4 feet into dry clay soil for the supports and reading engineering details were a couple of those challenges. Details such as how to construct for drainage and getting the drainage area from the roof to the scupper sealed water-tight caused some delays. Locating some materials such as the custom curb cap and the edge boards took a fair amount of time.

## **Observations**

Even with the heavy rains that have occurred since planting, the soil seems to be staying in place rather than sliding down the slope of the roof. I had been concerned this may be a problem since the planting medium was placed directly over the membrane.

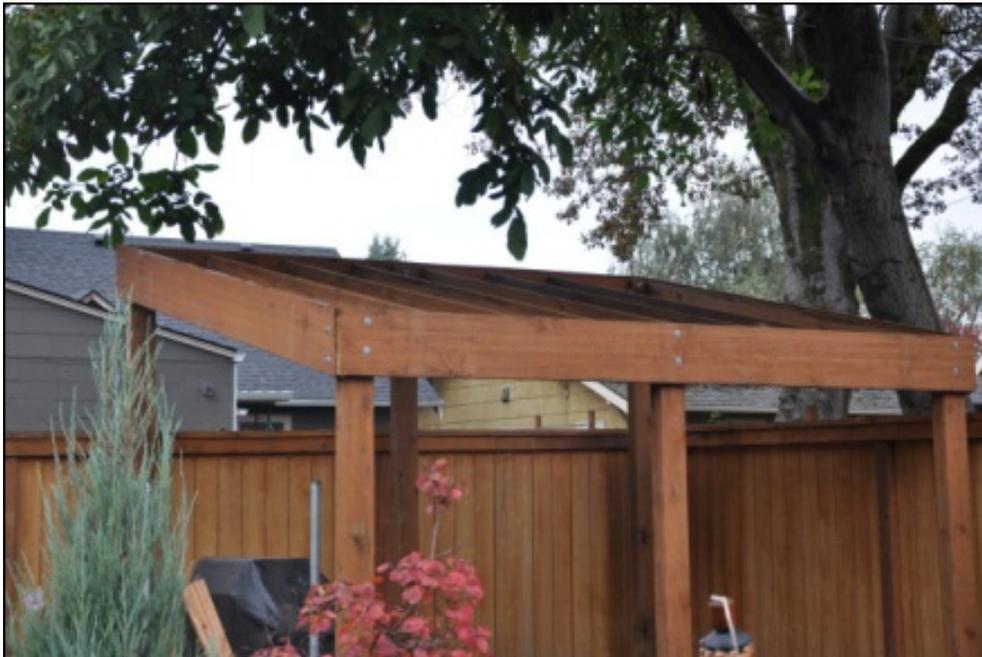
Laying out the main structural component of the planting plan (a double line of fescue) and viewing it from different angles was helpful in altering the planting plan slightly. I had planned on making a serpentine line with the fescue, but from the angle of view at ground level, it looked like they had been haphazardly placed. A diagonal line was used instead.

## **Future Plans**

I will be placing a rain barrel under the drain pipe and plan on replacing the galvanized metal scupper and drain pipe with a copper scupper and rain chain. I also plan on installing a rain garden for overflow from the rain barrel and to capture storm water from the existing garage.



4 x 6's in place



Roof framing complete



Pulley system used for soil



Arranging the Fescue



Final planting; top view



Final planting; ground view

